

## Reverse Engineering Genius: Through the Lens of World Language Collaborations

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**Abstract :** Over the past six years, the authors have been working together on World Language Collaborations in the Middle School French Program at St. Luke's School in New Canaan, Connecticut, USA. Author 2 brings design expertise to the projects, and both teachers have utilized the fabrication lab, emerging technologies, and collaboration with students. Each year, author 1 proposes a project scope, and her students are challenged to design and engineer a signature project. Both partners have improved the iterative process to ensure deeper learning and sustained student inquiry. The projects range from a 1:32 scale model of the Eiffel Tower that was CNC routed to a fully functional jukebox that plays francophone music, lights up, and can hold up to one thousand songs powered by Raspberry Pi. The most recent project is a Fragrance Marketplace, culminating with a pop-up store for the entire community to discover. Each student will learn the history of fragrance and the chemistry behind making essential oils. Students then create a unique brand, marketing strategy, and concept for their signature fragrance. They are further tasked to use the industrial design process (bottling, packaging, and creating a brand name) to finalize their product for the public Marketplace. Sometimes, these dynamic projects require maintenance and updates. For example, our wall-mounted, three-foot francophone clock is constantly changing. The most recent iteration uses Chat GPT to program the Arduino to reconcile the real-time clock shield and keep perfect time as each hour passes. The lights, motors, and sounds from the clock are authentic to each region, represented with laser-cut embellishments. Inspired by Michel Parmigiani, the history of Swiss watch-making, and the precision of time instruments, we aim for perfection with each passing minute. The authors aim to share exemplary work that is possible with students of all ages. We implemented the reverse engineering process to focus on student outcomes to refine our collaborative process. The products that our students create are prime examples of how the design engineering process is applicable across disciplines. The authors firmly believe that the past and present of World cultures inspire innovation.

**Keywords :** collaboration, design thinking, emerging technologies, world language

**Conference Title :** ICE 2025 : International Conference on Education

**Conference Location :** Prague, Czechia

**Conference Dates :** March 22-23, 2025